CLAIMS

1. A packet switch comprising:

one or more output queues for temporarily storing packets to be output from the packet switch;

one or more input ports each comprising one or more input queues for temporarily storing received packets, wherein each input queue is associated with one of said output queues and wherein each output queue is associated with input queues from different input ports;

a matrix for passing information between said inputs queues and said output queues;

control circuitry for controlling the rate of change of a transfer rate between associated input queues and output queues.

2. The packet switch of claim 1 wherein said control circuitry computes an acceleration value for each input queue.

3. The packet switch of claim 2 wherein said acceleration value for each input queue is based on a forward force for the input queue and a backward force for the output queue associated with the input queue.

4. The packet switch of claim 2 wherein said acceleration value for each input queue is based on a net force difference between said forward force for the input queue and said backward force for the associated output queue.

5. The packet switch of claim 4 wherein said forward force for each input queue is based on a length of an occupied portion of the input queue and the age of the oldest packet in the input queue.

6. The packet switch of claim 5 wherein said forward force for each queue is further dependent upon a length weighting factor and an age weighting factor.

7. The packet switch of claim 3 wherein said backward force for each output queue is dependent upon a length of an occupied portion of the output queue.

8. The packet switch of claim 7 wherein said backward force for each output queue is further dependent upon a predetermined balance point for the output queue.

9. The packet switch of claim 3 wherein the acceleration for each input queue is further dependent upon a mass value associated with the input queue.

10. The packet switch of claim 9 wherein said mass value may vary depending upon forward and backward forces associated with the input queue.

11. The packet switch of claim 2 wherein the transfer rate for each input queue is indicative of the probability of the input queue making a request to send a packet and the acceleration value is added a current transfer rate to determine a new transfer rate.

12. A packet switch comprising:

one or more output queues for temporarily storing packets to be output from the packet switch;

one or more input ports each comprising:

multiple input queues for temporarily storing received packets, wherein each input queue is associated with one of said output queues and wherein each output queue is associated with input queues from different input ports;

control circuitry for selectively generating requests, on each cycle, from a group of input queues that have packets to send on that cycle, responsive to a calculated transfer rate for that input queue; and

a server for selecting, on each cycle, one or more from said group to output a packet; and

a matrix for passing information between said inputs queues and said output queues.

13. The packet switch of claim 12 wherein said control circuitry computes an acceleration value for the input queue.

14. The packet switch of claim 13 wherein said acceleration value for each input queue is based on a forward force for the input queue and a backward force for the output queue associated with the input queue.

15. The packet switch of claim 13 wherein said acceleration value for each input queue is based on a net force difference between said forward force for the input queue and said backward force for the associated output queue.

16. A network comprising:

a plurality of interconnected packet switches, each packet switch comprising:

input and output queues, where output queues of one switch are coupled to and associated input queue of another switch;

control circuitry for controlling the rate of change of a transfer rate from an output queues to an associated input queue of another switch.

17. The network of claim 16 wherein said control circuitry computes an acceleration value for the input queue.

18. The network of claim 17 wherein said acceleration value for each input queue is based on a forward force for the input queue and a backward force for the output queue associated with the input queue.

19. The network of claim 17 wherein said acceleration value for each input queue is based on a net force difference between said forward force for the input queue and said backward force for the associated output queue.

20. A method of passing packets between input ports and output ports of a packet switch, wherein each output port has one or more output queues for temporarily storing packets to be output from the packet switch and each input port has one or more input queues for temporarily storing received packets, each input queue being associated with one of said output queues, comprising the steps of:

transferring packets between said input queues and associated output queues in accordance with a calculated transfer rate for each pair of associated input and output queues; and

periodically calculating a rate of change of the transfer rate between each of said pairs; and

changing the transfer rate in accordance with the rate of change.

21. The method of claim 20 wherein said calculating step comprises the step of computing an acceleration value for each input queue.

22. The method of claim 21 wherein said step of computing an acceleration value comprises the step of calculating an acceleration value for each input queue based on a forward force for the input queue and a backward force for the output queue associated with the input queue.

23. The method of claim 22 wherein said step of calculating an acceleration value comprises the step of calculating an acceleration value for each input queue based on a net force difference between said forward force for the input queue and said backward force for the associated output queue.

24. The method of claim 23 wherein said forward force for each input queue is based on a length of an occupied portion of the input queue and the age of the oldest packet in the input queue.

25. The method of claim 24 wherein said forward force for each queue is further dependent upon a length weighting factor and an age weighting factor.

26. The method of claim 22 wherein said backward force for each output queue is dependent upon a length of an occupied portion of the output queue.

27. The method of claim 26 wherein said backward force for each output queue is further dependent upon a predetermined balance point for the output queue.

28. The method of claim 21 wherein the acceleration for each input queue is further dependent upon a mass value associated with the input queue.

29. The method of claim 28 wherein said mass value may vary depending upon forward and backward forces associated with the input queue.

30. The method of claim 20 wherein said transfer rate for each input queue is indicative of the probability of the input queue making a request to send a packet.